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United States Patent Application of

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FOR

**IMAGE PROCESSING DEVICE AND METHOD COMPATIBLE WITH A
TELEVISION RECEIVER**

IMAGE PROCESSING DEVICE AND METHOD COMPATIBLE WITH A TELEVISION RECEIVER

Technical Field

This invention generally relates to digital image processing and more
5 particularly, to an image processing device and method compatible with a television
receiver.

Description of the Related Art

Increased availability of digital cameras has popularized digital photography
and digital images. Unlike traditional photographs, users can immediately display
10 these digital images on a suitable display device without the need for expensive and
complex chemical processes. Typically, the digital camera captures the digital images
on a storage device that uploads images to a computer for display on a computer
monitor. To receive the digital images for uploading, the computer may require a
special communication interface and corresponding software to communicate with the
15 digital camera. The computer may also require special software to display the digital
images on a display device.

Unfortunately, without such specially equipped computers digitally
photography can be quite difficult. The digital camera may not communicate properly
with a computer lacking the proper communications interface and corresponding
20 software.

Once uploaded, special software capable of processing these digital images
may be necessary for the images to be viewed and enjoyed on a computer. The
processing may include a variety of proprietary compression and image processing
routines unique to the digital image, the digital camera, or both. Consequently,

incompatible software or software without these features may render the images difficult for others to view and enjoy. For example, an image may be viewed on a computer at work but may not be viewed at home because a home computer does not have the proper software and processing capabilities. Moreover, for people without a
5 computer or computer skills, digital photography may not even be a viable option to the traditional photography requiring additional chemical processing and corresponding costs.

Accordingly, there is a need to create an apparatus and methods that receive and display digital images in a more convenient manner using a display device such
10 as a television.

Disclosure of The Invention

In accordance with the present invention, as embodied and broadly described herein, a method for processing digital images and displaying them on a television receiver is provided. Initially, an image processing device receives digital image data
15 from a digital camera or other digital device. Next, the digital image is stored on a storage device associated with the image processing device. This digital image on the storage device is then converted into television signals compatible with a television receiver and supplied to a television for display.

Another aspect of the present invention provides an apparatus for processing digital images. This apparatus includes a first input terminal capable of receiving digital image data, a second input terminal capable of receiving commands from a user, an output terminal capable of supplying digital image data to a television
5 receiver external to the apparatus, a storage device associated with the apparatus

capable of storing the digital image data, and a processor capable of executing instructions in response to commands received over the second input terminal that store the received digital image in the storage device and transmit the stored digital image to the television receiver for display thereon.

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Brief Description of the Drawings

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate systems and methods consistent with the invention and, together with the description, serve to explain the advantages, and principles of the invention.

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In the drawings:

FIG. 1 is a block diagram of an digital photography system used to display digital images;

FIG. 2 is a block diagram illustration of components within a imaging processing device designed in accordance with one implementation of the present invention; and

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FIG. 3 is a flowchart diagram indicating the stages used to display digital images on television receiver.

One Embodiment for Carrying Out the Invention

Digital Photography System

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FIG. 1 is a block diagram of an digital photography system 100 used to display digital images. Digital photography system 100 includes a conventional television receiver 102, an imaging processing device 104, a remote-control device, a digital image input device 106, and a wireless digital image input device 110.

Television receiver 102 has a receiver section compatible with conventional broadcast signals such as NTSC, DTV (Digital television), and PAL type television signals.

Each television receiver 102 also includes a display portion for displaying images.

Image processing device 104 is a set-top box device designed in accordance
5 with the present invention that provides digital images to television receiver 102 in a format compatible with NTSC, DTV, PAL, or any other format used to display images on a television. An output terminal on device 104 connects to a standard video input terminal on television 102. Alternatively, device 104 can be connected to television 102 using a wireless connection. The wireless connection enables device
10 104 to broadcast images to one or more televisions in a nearby area without physical cabling. This is advantageous for families with multiple televisions. Image processing device 104 can receive digital images from image capture devices over a first input terminal having a wireless connection, a physical connection, or a combination of both. Images can be stored on a storage device within image
15 processing device 104. A second input terminal on image processing device 104 receives commands from remote-control device 105.

Digital image input device 106 can be a digital camera, a digital video camera, or any other device image capture device that produces digital image data. The connection between digital image input device 106 and imaging processing device
20 104 may be a universal serial bus (USB), IEEE-1394 ("Firewire"), or any other type of communication link having a standard physical interface.

Wireless digital image input device 110 can also be an image capture device that uses a wireless connection to imaging processing device 104 rather than a

physical connection. For example, the communication link between digital image input device 106 may perform wireless communication using such protocol stacks as established by the Infra-red Data Association (IrDA). These communication links may also include radio frequency (RF) type communications. Images transferred to
5 imaging processing device 104 can be processed using various image processing routines before being displayed.

Remote-control device 105 facilitates entering commands into image processing device 104 to process digital images. A wireless communication link transmits commands between remote-control device 105 and image processing device
10 104. A directional button on remote-control device 105 allows a user to move a cursor, a pointer, or other symbolic pointing element around on a menu displayed on the display of television receiver 102. The user selects menu options provided on the display using the directional button in conjunction with the symbolic pointing element. In addition an alpha-numeric keypad on remote-control device 105 allows
15 the user to also enter alpha-numeric values for selecting, naming, and operating on images.

FIG. 2 is a block diagram illustration of components within imaging processing device 104 designed in accordance with one implementation of the present invention. Imaging processing device 104 includes a processor 202, an input-output
20 interface 204, a digital interface 206, a wireless interface 208, memory 210, television interface 212, and a secondary storage 214, coupled together over an internal bus 216.

Processor 202 can be a general purpose processor such as an Intel Pentium processor or an application specific integrated circuit (ASIC) designed to execute an

application designed in accordance with the present invention. Input-output interface 204 can be connected to a number of different peripheral devices such as a keyboard, a mouse, an external storage device, or a printer.

Digital interface 206 adheres to a digital standard such as the IEEE-1394 digital serial interface or USB. Devices using the digital interface may be less expensive and faster because they do not need analog to digital converters and bypass the additional analog processing. In particular, digital interface 206 may receive digital images from a digital camera. Wireless interface 208 receives information through infrared or radio frequency (RF) communications thus obviating cables or other special equipment. Television interface 212 couples the imaging processing device 104 to television receiver 102 providing a conduit for supplying images in NTSC, PAL, DTV or other formats compatible with the television receiver 102. Secondary storage 214 includes a hard disk, memory, or any other storage medium capable of storing images to be processed by imaging processing device 104.

Memory 210 includes a user interface 218, a digital image enhancement process 220, and a run-time environment 222. User interface 218 enables a user to display images on television receiver 102 and control the processing of images. An easy-to-use set of menu selections on user interface 218 facilitates receiving, storing, selecting, viewing, and transmitting through electronic mail the various digital images. Operating a remote control device, a user can select to display this menu system on the display of television receiver 102 while optionally blocking out other television or video signals. Alternatively, the menu system may automatically appear on the display when imaging processing device 104 receives power. For example,

menu selections on user interface 218 may have selectable buttons labeled to store, retrieve, and delete images stored on secondary storage 214. In addition, user interface 218 may include advanced features for processing images with image processing routines such as edge sharpening, image softening, image cropping, and
5 other image enhancements.

Digital image enhancement process 220 provides software routines for performing the above mentioned image enhancement routines as well as routines for compression, decompression, and formatting of data. For example, digital image enhancement process 220 includes routines for processing JPEG, MPEG, TIF, GIF,
10 and other image formats typically used to display images known to those skilled in the art. Digital image enhancement process 220 also includes the ability to incorporate additional routines for processing other types of image data. For example, new formatting and compression routines can be downloaded through digital interface 206 to upgrade the digital image enhancement process 220.

15 Run-time environment 222 facilitates execution on processor 202 of software processes located in memory 210 discussed above. Different run-time environments 222 compatible with implementations of the present invention include real-time operating systems (RTOS) for real-time processing, UNIX-based operating systems, or Microsoft Windows. Run-time environment 222 also includes drivers and other
20 routines necessary for input-output interface 204, digital interface 206, wireless interface 208, and television interface 212 to receive and transmit data.

FIG. 3 is a flowchart diagram indicating the stages used to display digital images on television receiver 102. Initially, a user connects a digital image input

device such as a camera or video camera to image processing device 104. The user configures television receiver 104 to receive signals from the image processing device 104. Using either a wireless connection or a physical connection, imaging processing device 104 then receives digital image data (stage 302). Next, imaging processing device 104 stores digital image data on a storage device associated with imaging processing device 104 (stage 304). Television receiver 102 then receives digital image data from imaging processing device 104 (stage 306). Imaging processing device 104 converts the digital image data into television signals compatible with television receiver 102 such as NTSC, PAL, or DTV formats. Once properly converted, these signals are transmitted to television receiver 102 for display on the display portion of the television receiver (stage 308). By using imaging processing device 104, digital images can be displayed without a computer.

While specific embodiments have been described herein for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Further, although aspects of the present invention are described as being stored in memory and other storage mediums, one skilled in the art will appreciate that these aspects of the present invention can also be stored on or read from other types of computer-readable media, such as secondary storage devices, like hard disks, floppy disks, or CD-ROM; a carrier wave from the Internet, or other forms of RAM. Accordingly, the invention is not limited to the above described embodiments, but instead is defined by the appended claims in light of their full scope of equivalents.